AD-A168 744 AUTEC CABLE ROUTE SURVEY ANDROS ISLAND BAHAMAS SITES 1 2 AND 7(U) TRACOR MARINE PORT EVERGLADES FL OCEAN TECHNOLOGY DIV 10 JUN 83 CHES/NAVFAC-FPO-8362 1/1

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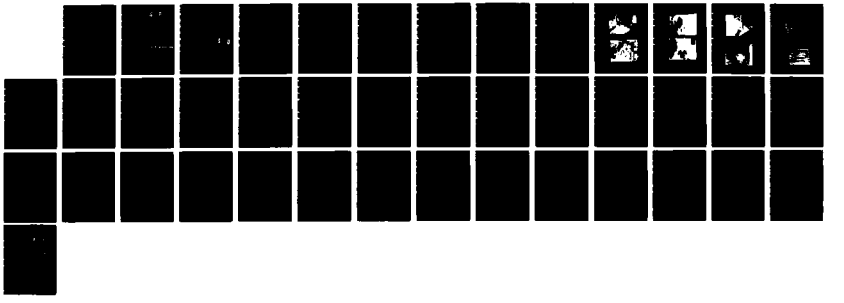

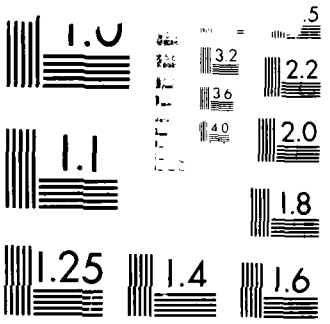
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AUTEC CABLE ROUTE SURVEY
ANDROS ISLAND, BAHAMAS
SITES 1, 2 and 7

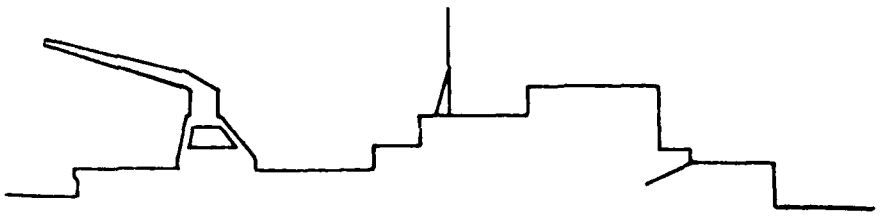
Submitted to:

Naval Facilities Engineering Command

By

Tracor Marine, Inc.

10 June 1983



Ocean Engineering

CHESAPEAKE DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
WASHINGTON NAVY YARD
WASHINGTON, DC 20374

Tracor Marine

AUTEC CABLE ROUTE SURVEY
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19. ABSTRACT (Continue on reverse if necessary & identify by block number)
In accordance with Tracor Marine's Op-plan of 18 May 1983 and the u.s. Navy's Atlantic Undersea Test & Evaluation Center Operations Directive 83-202 of 24 May 1983, Tracor Marine conducted precision bathymetric surveys at Autec Sites 1, 2 and 7 during May and June 1983. Using the LCU 1647 as a survey (Con't)

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platform, the survey equipment consisted of an EDO Model 4077 Narrow Beam Towed Bathymetric System, a Decca Trisponder Navigation System and an HP 9825 - based data acquisition system.

The survey at Site 1, consisting of five sounding lines running perpendicular to the bottom contours, was completed on May 30. The measurements at Site 2 were completed on May 31 and consisted of ten perpendicular runs. on June 3 at Site 7, three perpendicular lines were completed with two 2nm by 1nm grids developed at the eastern and westernmost areas. Aside from minor navigational problems and delays on June 3, no difficulties were encountered in the conduct of this survey, and the project was completed several days ahead of schedule.

Tracor Marine

FINAL REPORT

AUTEC CABLE ROUTE SURVEY

ANDROS ISLAND, BAHAMAS

SITES 1, 2 AND 7

Submitted to:

NAVAL FACILITIES ENGINEERING COMMAND
BUILDING 200
WASHINGTON NAVY YARD
WASHINGTON, DC 20374

CONTRACT NUMBER
N00600-81-D-5270

TRACOR MARINE, INC.
JOB NUMBER 723511

10 June 1983

Approved Edward Clausner
Edward Clausner
Vice-President

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APPENDICES (Separately packaged)

A. Original Bathymetric Analog Records.
B. Original Data Acquisition Records.
C. Original (and two copies) Tracor Marine Sounding Logs.
D. Original (and two copies) Tracor Marine Watch Logs.
E. Developed Sounding Sheets at 1:5000 scale for each area surveyed (Original mylar plus two copies of each).
F. Developed Vessel Track Sheets at 1:5,000 scale for each area surveyed (original drafting film plus two copies of each).
G. Developed 1:1 scale Vertical Profiles of each Sounding Run at Sites 1 and 2 (original drafting film plus two copies of each).
H. Developed 5:1 scale Vertical Profile Comparisons of Sounding Runs at Sites 1 and 2 (original drafting film plus two copies of each).

1.0 SUMMARY

In accordance with Tracor Marine's Op-plan of 18 May 1983 and the U.S. Navy's Atlantic Undersea Test and Evaluation Center Operations Directive 83-202 of 24 May 1983, Tracor Marine conducted precision bathymetric surveys at Autec Sites 1, 2 and 7 during May and June, 1983. Using the LCU 1647 as a survey platform, the survey equipment consisted of an EDO Model 4077 Narrow Beam Towed Bathymetric System, a Decca Trisponder Navigation System and an HP 9825 - based data acquisition system. The Tracor Marine Survey Team was composed of the following individuals:

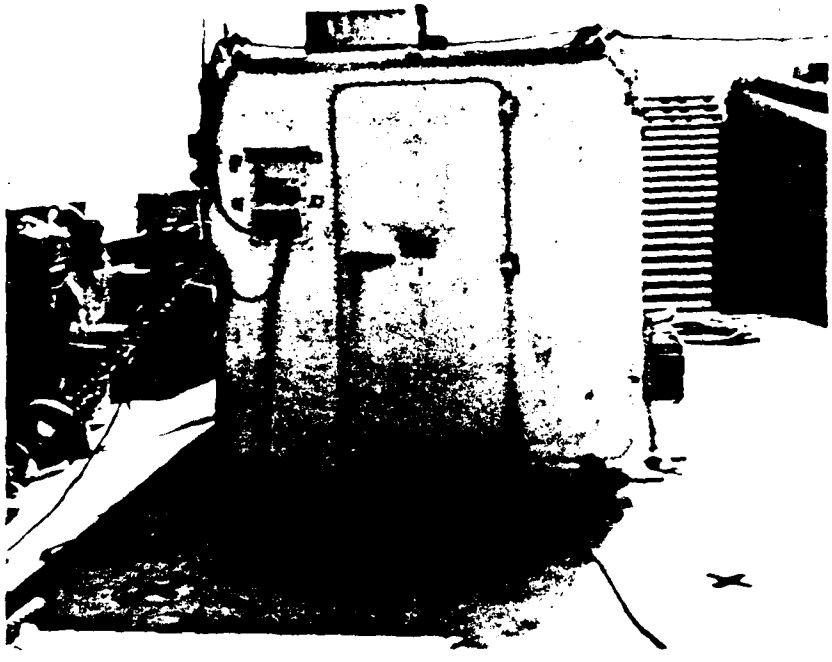
Dr. Lanny Yeske, Project Manager
Mr. Dennis Kembro, Project Coordinator
Mr. Patrick Sanders, Hydrographer/ Cartographer
Mr. Calib Magruder. Cable Route Engineer
Mr. Dallis Copeland Acoustic Technician

The survey at Site 1, consisting of five sounding lines running perpendicular to the bottom contours, was completed on May 30. The measurements at Site 2 were completed on May 31 and consisted of ten perpendicular runs. On June 3 at Site 7, three perpendicular lines were completed with two 2nm by 1nm grids developed at the eastern and westermost areas. Aside from minor navigational problems and delays on June 3, no difficulties were encountered in the conduct of this survey, and the project was completed several days ahead of schedule.

The purpose of this document is to present technical information on the procedures used by Tracor Marine to conduct the survey and to reduce the data as well as to formally transmit to the Naval Facilities Engineering Command the following deliverables:

- Original Bathymetric Analog Records
- Original Data Acquisition Records.
- Original Tracor Marine Sounding Logs.
- Original Tracor Marine Watch Logs.
- Developed Sounding Sheets at 1:5,000 scale for each area surveyed (original mylar plus two copies of each).
- Developed Vessel Track Sheets at 1:5,000 scale for each area survey (original drafting film plus two copies of each)
- Developed 1:1 scale Vertical Profiles of each sounding run at Sites 1 and 2 (original drafting film plus two copies of each).
- Developed 5:1 scale Vertical Profile Comparisons of sounding runs at sites 1 and 2 (original drafting film plus two copies).

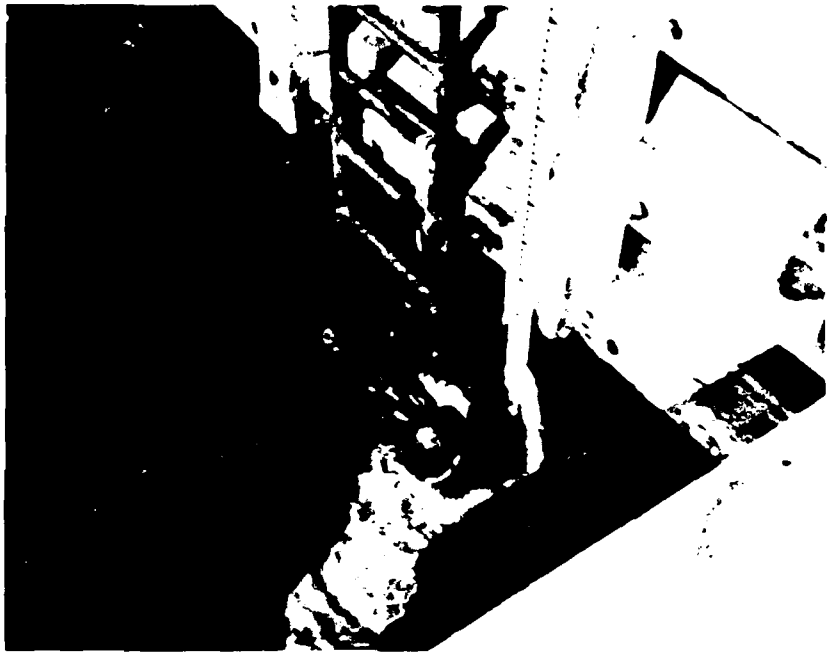
The following four pages provide photographs of the LCU 1647 laboratory and towfish rigging configurations as well as the specific tide staff and reef locator systems employed for this survey.



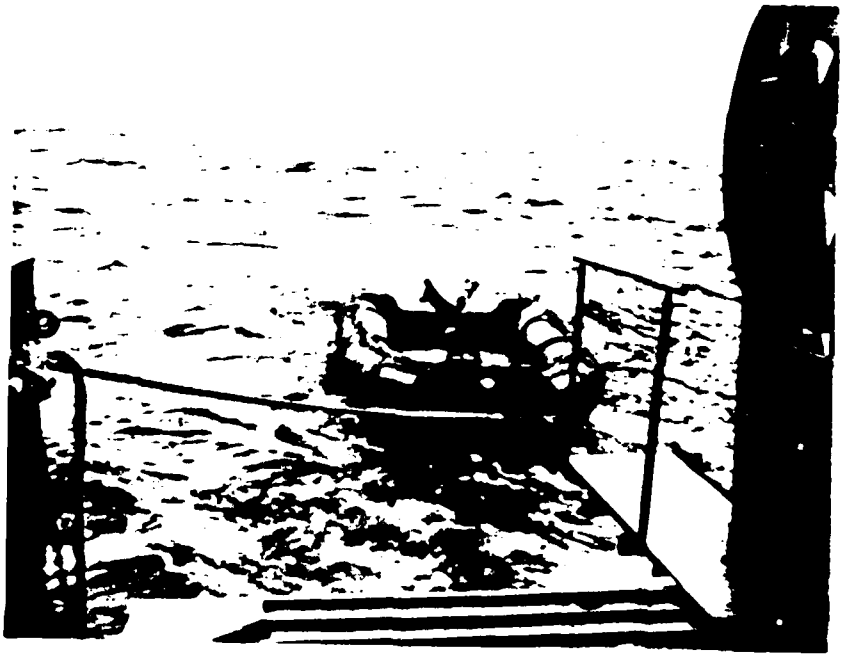
LCU 1647 LABORATORY

LABORATORY TECHNICIANS

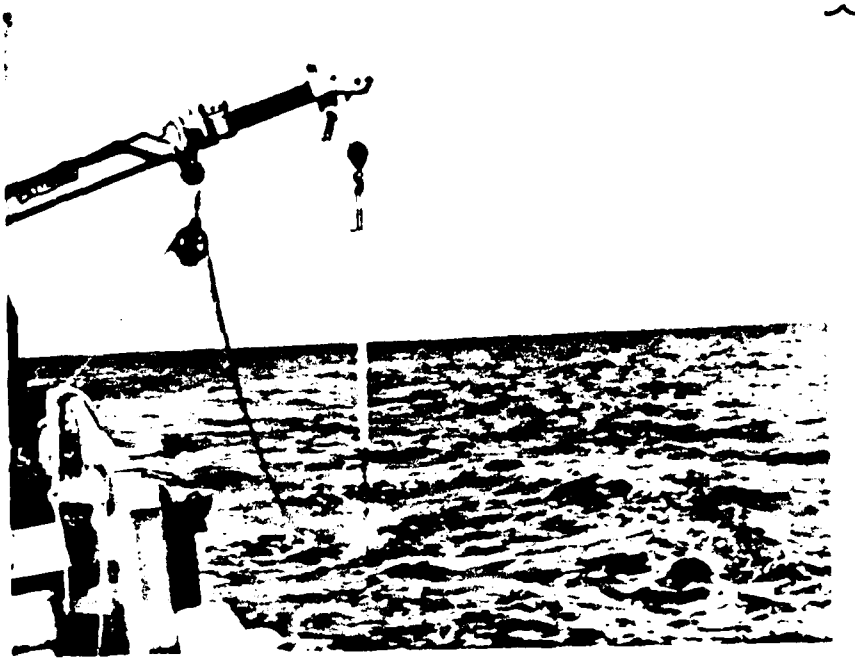
LABORATORY SUPERVISORS



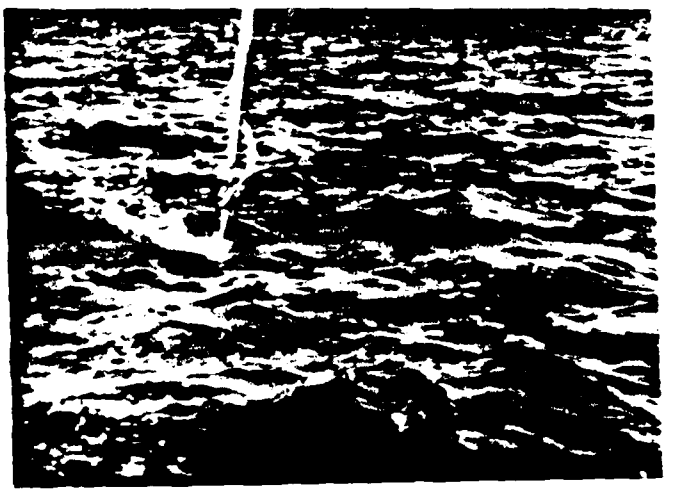
TIDE STAFF-AUTEC PIER



REEF LOCATOR



TOWFISH RIGGING



DATA COLLECTION

2.0 EVENT LOG

15 March 1983	Conducted initial technical discussions with NAVFAC and NUSC.
31 March 1983	Pre-site visit by Tracor Marine to Autec Sites.
21 April 1983	NAVFAC/NUSC Tasking.
18 May 1983	Tracor Marine Op-plan completed.
24 May 1983	AUTEC Operations Directive completed.
25 May 1983	Final planning conference with NAVFAC, NUSC and Tracor Marine in Fort Lauderdale.
26 May 1983	Personnel and equipment arrive AUTEC. 1530 meeting at AUTEC Command and Control to update the operational plan.
27 May 1983	Completed loading of equipment on LCU 1647. Tide staff installed on AUTEC pier.
28 May 1983	Conducted sea trials. All navigation and sounding equipment operating normally.

29 May 1983	Interim array retrieval operations. No survey operations planned or conducted.
30 May 1983	Conducted and completed bathymetric survey Site 1 from 1350 to 1850 with 5 lines perpendicular to bottom contours. All equipment operating normally.
31 May 1983	Conducted and completed bathymetric survey Site 2 from 0735 to 1815 with 10 lines run perpendicular to bottom contours. All equipment operating normally.
1 June 1983	Weather Day.
2 June 1983	Weather Day.
3 June 1983	LCU underway 0200 for transit to Site 7. Navigation problems delay survey start from 1000 to 1327. Survey commences but intermittent navigation problems continue. At 1410, LCU via AUTEC informs Tracor Marine in Fort Lauderdale of navigation difficulties and requests replacement trisponder system be sent ASAP. At 1530, replacement unit is

3 June 1983 (Cont'd)	loaded aboard AUTEC plane in West Palm Beach and arrives AUTEC at 1830. Site 7 survey completed at 2123.
4 June 1983	LCU 1647 returns AUTEC Base. Vessel demobilization. Tracor Marine personnel and equipment return to Fort Lauderdale at 1530. Data analysis and final report preparation continues.
10 June 1983	Final report and analysis forwarded to NAVFACENGCOM.

3.0 NAVIGATION

The NUSC supplied Decca Trisponders and an HP 9825 - based data acquisition system were used to position the LCU during sounding operations. For the survey at Site 1, Trisponder antennas were located at Sites 1 and 2. For survey work at Site 2, Trisponder antennas were installed at Sites 1 and 3. At Site 7, antennas were positioned at Sites 6 and 7. Geographic positions (GP), antenna heights and Universal Transverse Mercator (UTM) coordinates for the shore NAVAID sites are given in Table 1.

The horizontal offset between the ship's Trisponder antenna and the towed transducer was measured daily and appropriate offsets were applied to the navigational fixes.

It should be noted that for the survey at Site 2, the use of Trisponders at Sites 1 and 3 provided less than optimum angles of intersection for positioning. This was most pronounced in near shore areas where the angle of intersection approached 10 degrees.

TABLE 1

AUTEC ANTENNA LOCATIONS

Site 1	N24° 42' 20.97"	N 2,735,041.749
	W77° 45' 54.89"	E 220,223.007
	HT = 90' EST = 27.4 m	
Site 2	N24° 29' 53.97"	N 2,711,958.265
	W77° 43' 10.55"	E 224,389.325
	HT = 66.3' = 20.2 m	
Site 3	N24° 20' 17.0743"	N 2,694,131.454
	W77° 40' 59.9682"	E 227,723.084
	HT = 60' = 18.3 m	
Site 6	N24° 00' 23.69"	N 2.657,112.857
	W77° 31' 43.55"	E 242,749.188
	HT = 8.550 m	
Site 7	N23° 54' 00.71"	N 2.645,255.235
	W77° 29' 19.46"	E 246,614.703
	HT = 23.979 m	

Spheroid: Clarke 1866 (NAD 1927)

4.0 SOUNDINGS

Soundings were taken using the Edo Model 4077 Narrow Beam Towed Bathymetric System, supplied by Tracor Marine. All soundings were taken using the 40kHz, 5^{o} narrow beam transducer. This transducer provided the resolution and definition needed when surveying perpendicular to the steep walls off Andros Island. The transducer depth was measured daily and is incorporated in the sounding on the smooth sheets. A heave compensator was also supplied by Tracor Marine but was not used due to a calm sea state and stable towing conditions.

Tide corrections ranging from 0 to 2 feet, were applied to all soundings under 600 feet. A tide staff was erected at the AUTEC Pier and observed to establish correlations with predicted tide information from published NOAA tide tables. Variances of observed versus predicted tide heights were less than .2 feet. Predicted tides were used to adjust soundings to the Mean Low Water datum.

At Site 7, where it was feasible to compare soundings at principal line and crossline intersections, total agreement in soundings was observed.

In several areas while traversing steep bottom gradients, the digitizer "gate" could not accurately track the bottom. This

resulted in having to manually scale the analog trace to obtain depth data, however, this did not pose much of a problem. Part of the digitizer's trouble was due to the increasing speed of the survey vessel. At the recommended towing speed of 4-5 knots, the digitizer performed well. By the end of the survey, the ship speed was approximately 7 knots and the digitized data was degraded in areas with steep gradients.

5.0 DATA PROCESSING

Sounding and Track Sheets are UTM projections using the Clarke 1866 Spheroid North American Datum of 1927. All sheets are at a scale of 1:5,000. The Sheet layout for the surveys at Sites 1,2 and 7 are given in Figures 1, 2 and 3 respectively.

For Site 1, Sheet 1A contains four sounding lines run perpendicular to the bottom contours. Sheet 1B contains a fifth line. For Site 2, Sheet 2A contains nine lines (two at line 5) run perpendicular tc bottom contours. Sheet 2B contains an additional line run at High Cay. For Site 7, Sheet 7A contains the westernmost of the two grids run in this area. Sheets 7B and 7C contain three lines run perpendicular to bottom contours while sheet 7C also contains the eastern grid.

In constructing the sounding and vessel track sheets Red and Green Trisponder values were taken from the HP 9825 computer printout and converted to UTM coordinates for the ships's position at one minute intervals. These fixes were then plotted on the UTM projection. The transducer offset (variable for each Site) was then applied to obtain the correct position of the transducer.

Digitized soundings on the computer printouts were also compared to the analog trace to verify their correctness. False echos and noise, which had been digitized as bottom, were edited out. Soundings were then corrected for transducer depth and tides, and plotted in their correct location on the sounding sheets. Soundings were contoured at 100 feet, 200 feet, and every 200 feet thereafter.

SITE 1

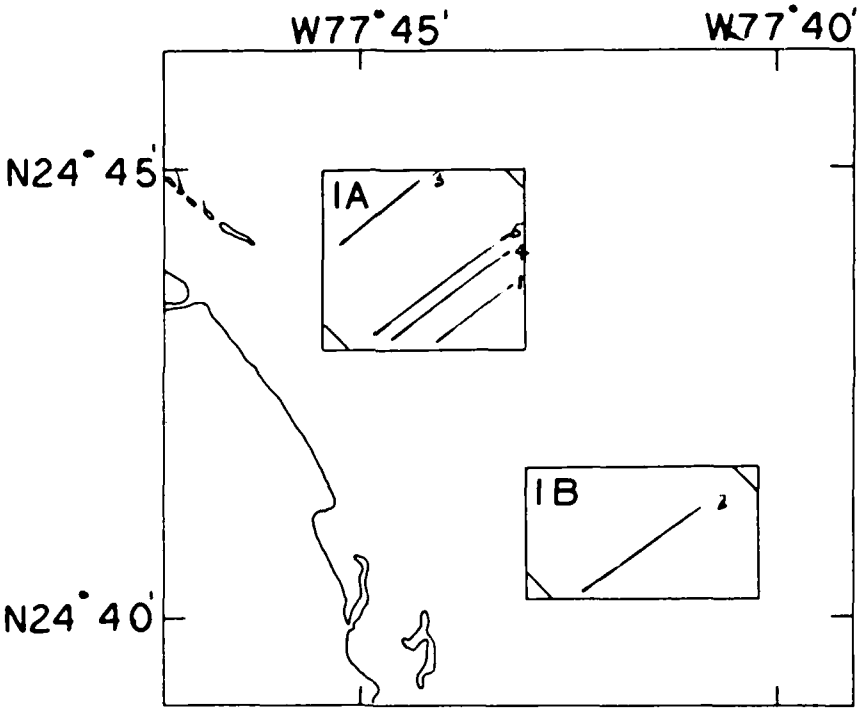
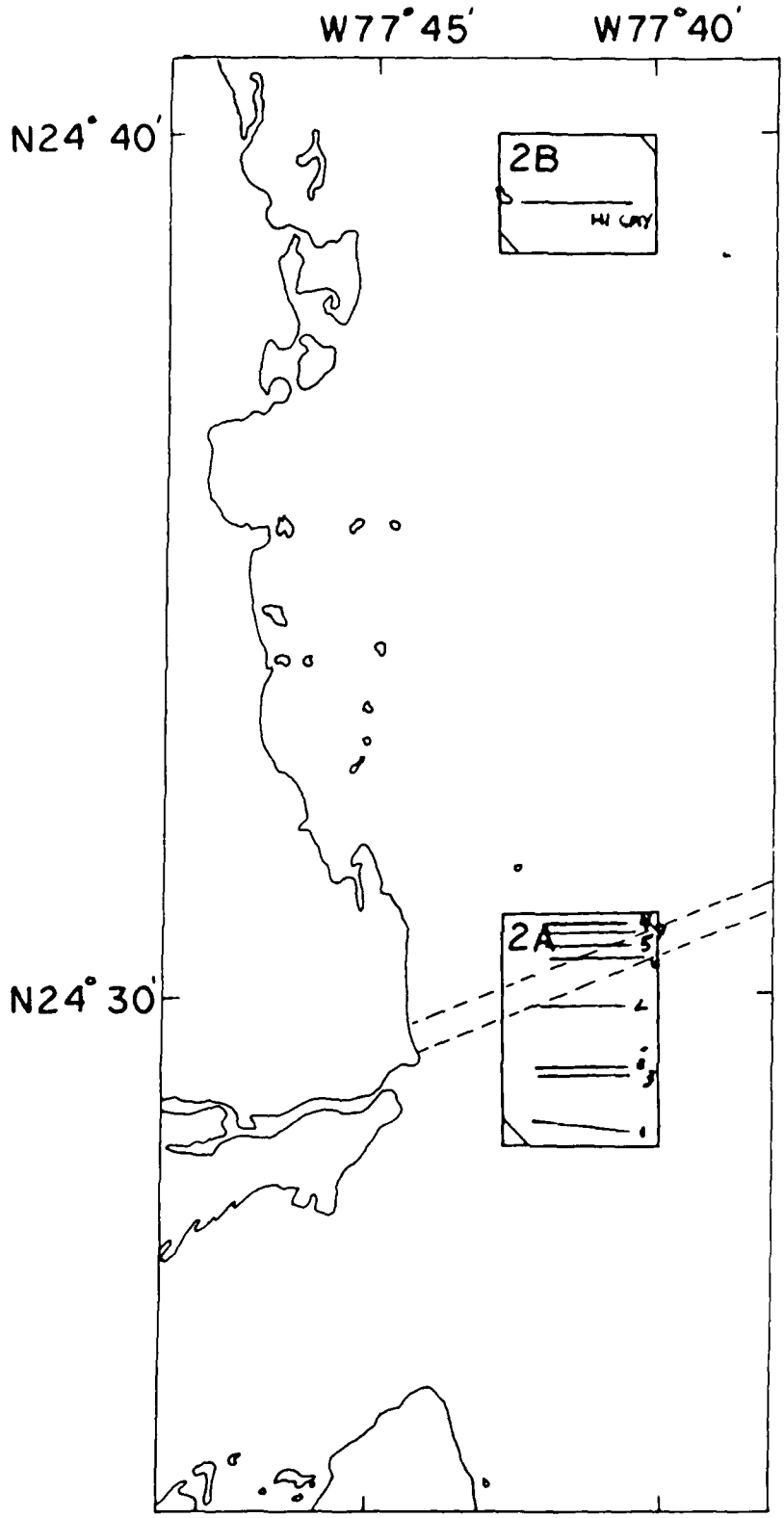


Figure 1



SITE 2

Figure 2

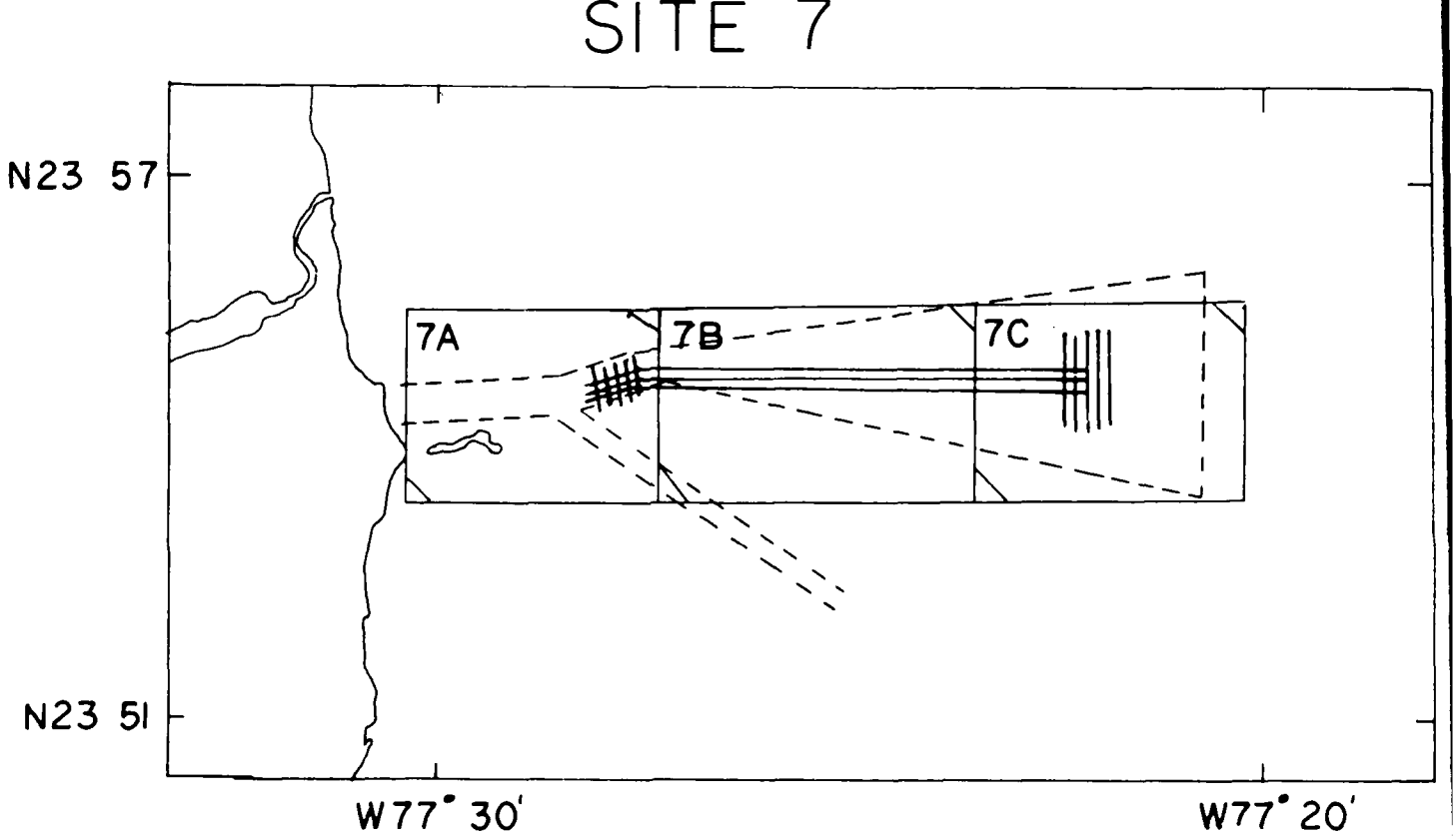


Figure 3

6.0 DELIVERABLES

The following deliverables (separately packaged) are being supplied to Naval Facilities Engineering Command for use or distribution as desired:

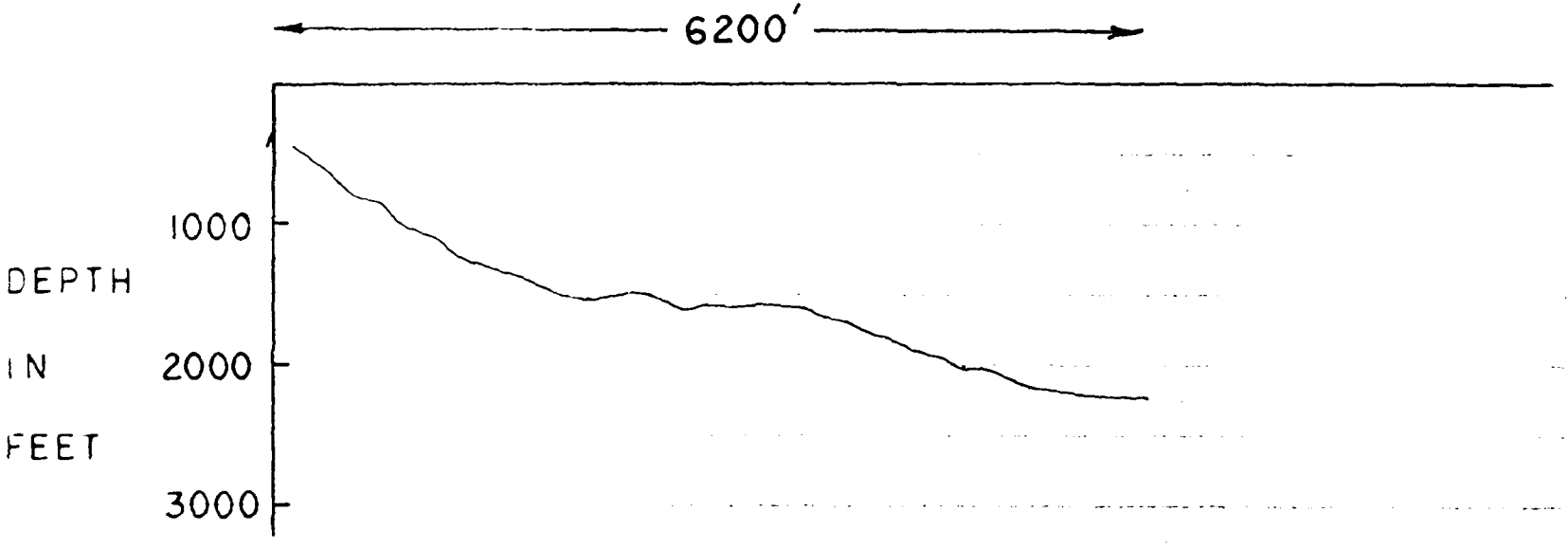
Appendix A:	Original Bathymetric Analog records from EDO Model 4077 System at Sites 1, 2, 7 and during sea trials.
Appendix B:	Original Data Acquisition System Records from NUSC supplied HP 9825 based system.
Appendix C:	Original and two copies of Tracor Marine's Sounding Logs at Sites 1, 2 and 7.
Appendix D:	Original and two copies of Tracor Marine's Watch Logs at Sites 1, 2 and 7.
Appendix E:	Original and two copies of Sounding Sheets 1A, 1B, 2A, 2B, 7A, 7B and 7C plotted on .007" thick Herculene Drafting Film.

6.0 DELIVERABLES (Cont'd)

Appendix F:	Original and two copies of Vessel Track Sheets 1A, 1B, 2A, 2B, 7A, 7B and 7C plotted on .025" thick Albanene Drafting Film with pre-printed precise millimeter grid.
Appendix G:	Original and two copies, 1:1 horizontal to vertical scale, of Vertical Profiles of each Sounding Run at Sites 1 and 2.
Appendix H:	Original and two copies, 5:1 horizontal to vertical scale, of Vertical Profile Comparisons of Sounding Runs at Sites 1 and 2.

7.0 CONCLUDING REMARKS

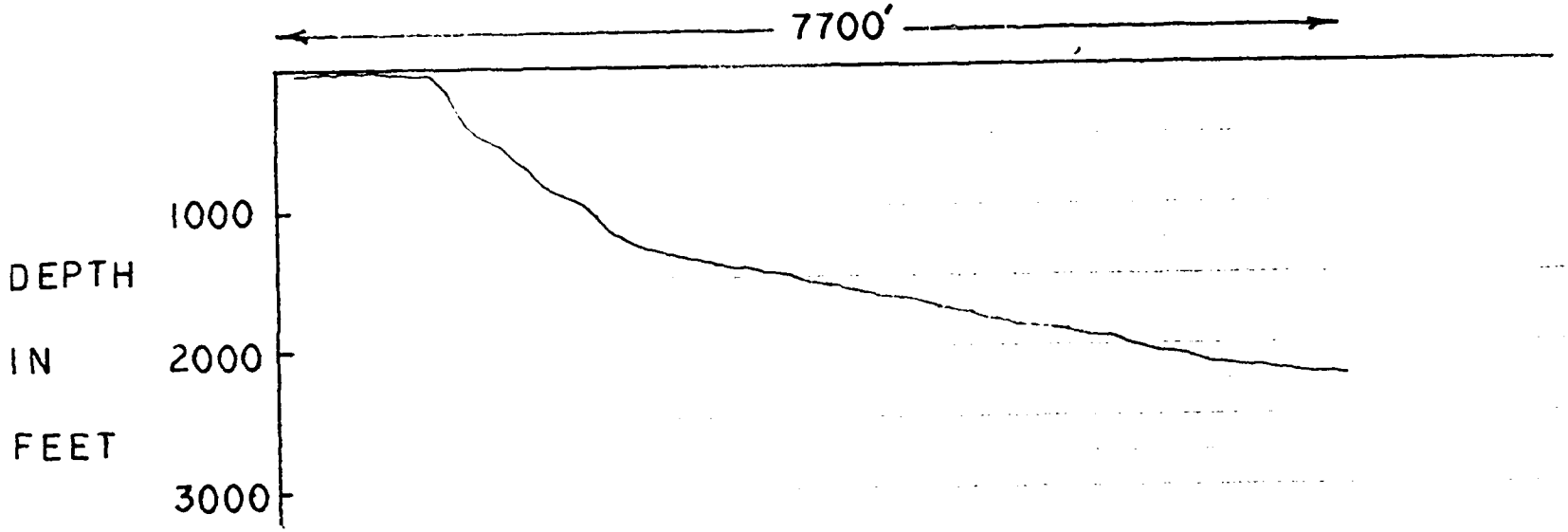
The fact that this project was completed ahead of schedule and under-budget reflects the amount of assistance and co-operation rendered to Tracor Marine. As such, we would like to express our sincere appreciation and gratitude to the numerous individuals from NAVFAC, NUSC, RCA, LCU 1647 and AUTEC (both on Andros Island and in West Palm Beach) who contributed significantly to this effort and its successful completion.



SITE 2

TRACK 1

SHEET 2A



SITE 2

TRACK 2

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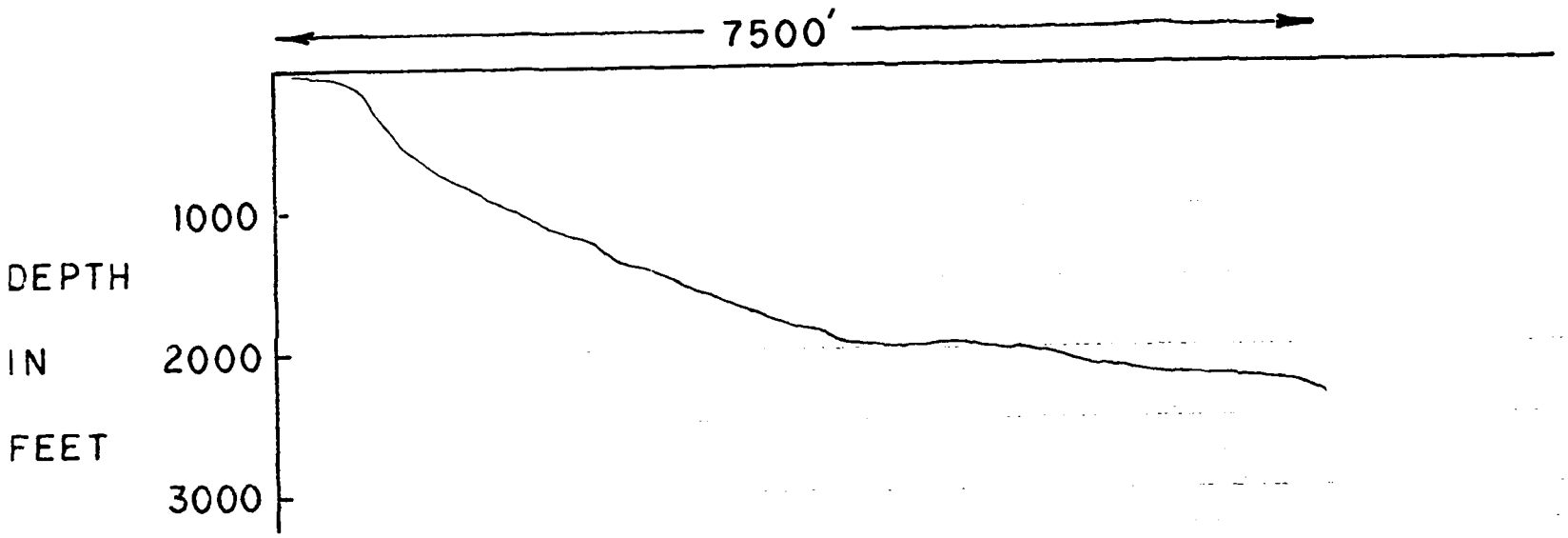
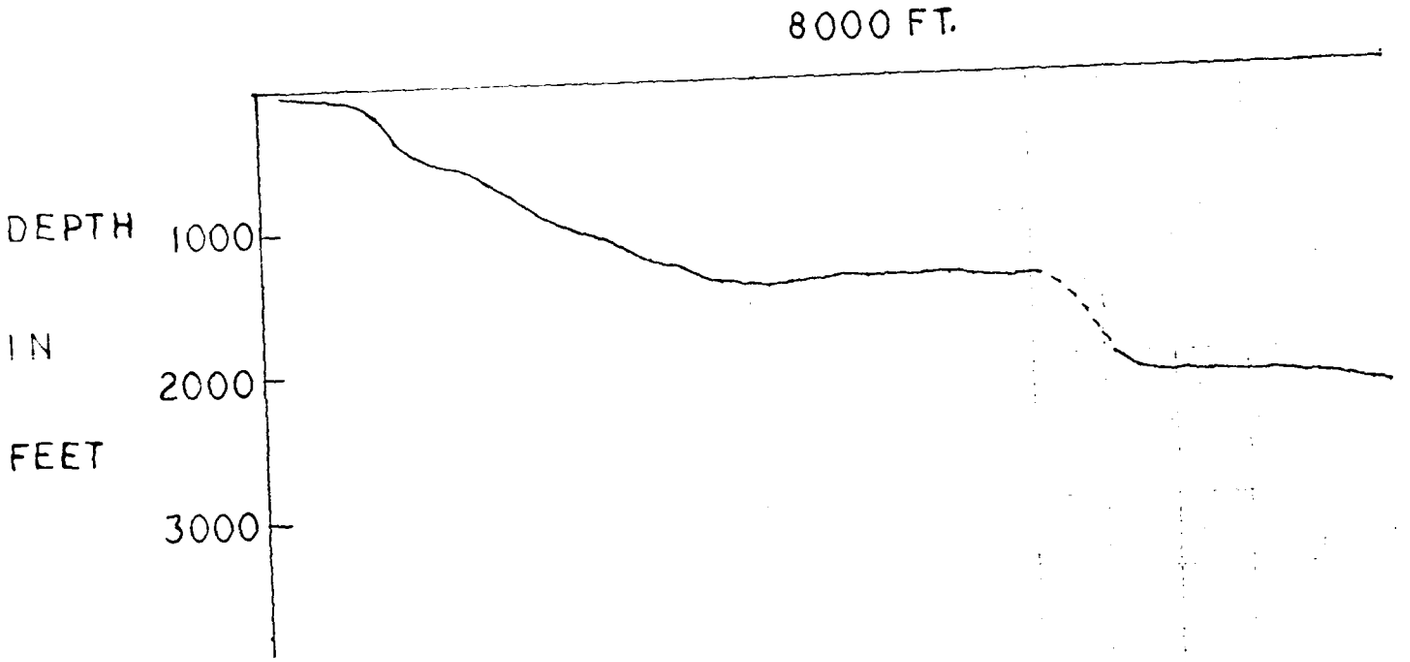


SITE 2

TRACK 3

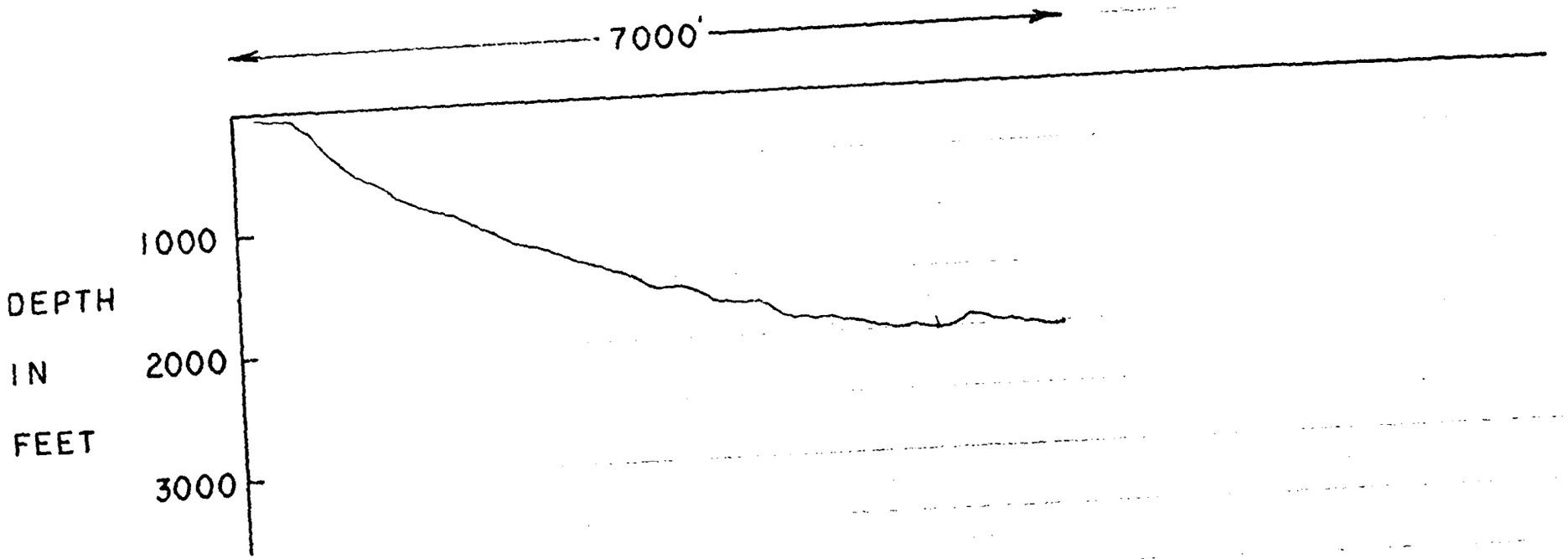
SHEET 2A



SITE 2

TRACK 4

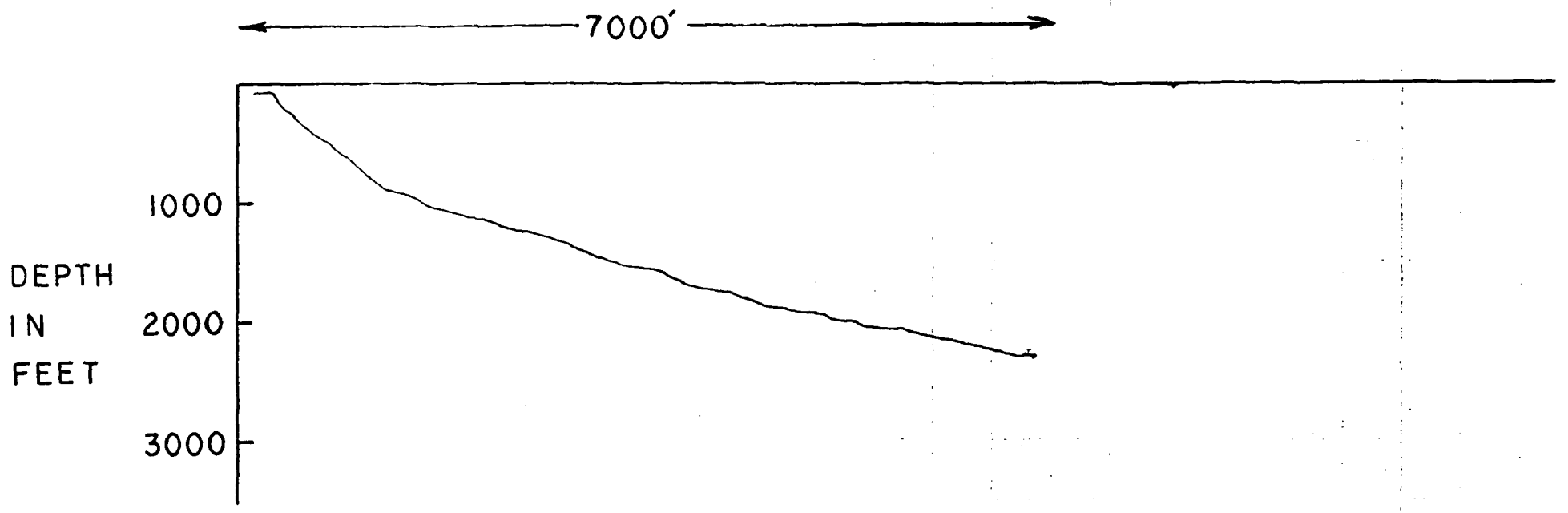
SHEET 2A



SITE 2

TRACK 5

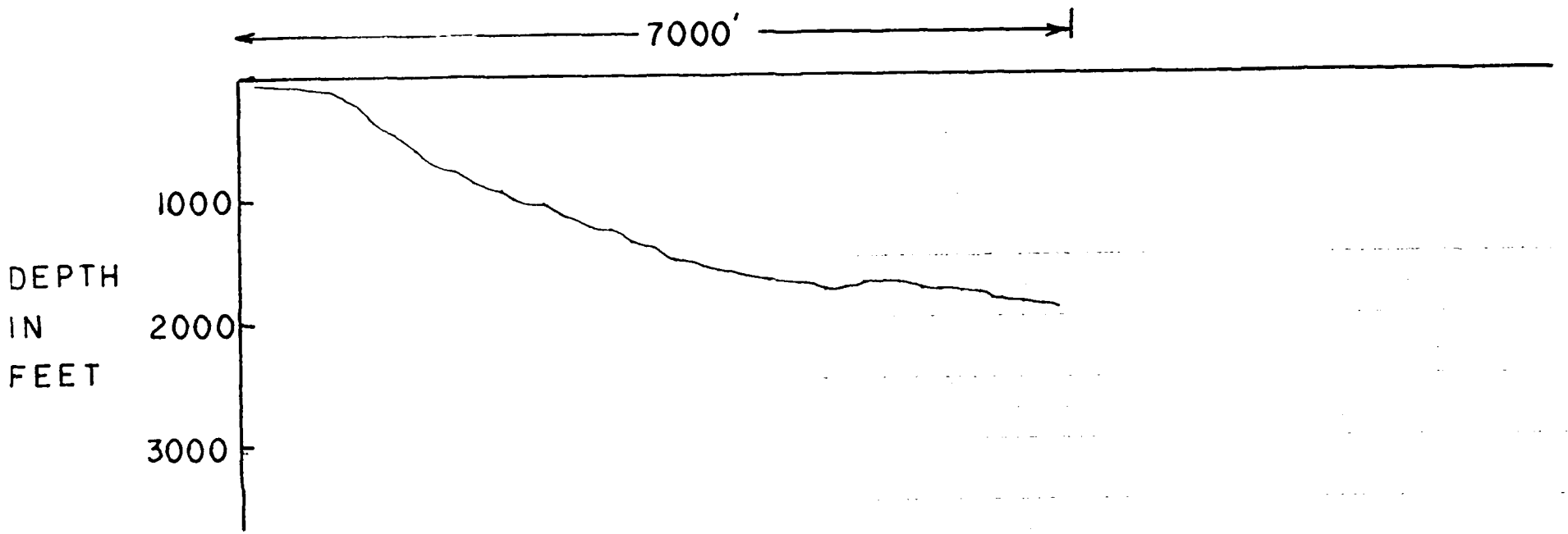
SHEET 2A



SITE 2

TRACK 6

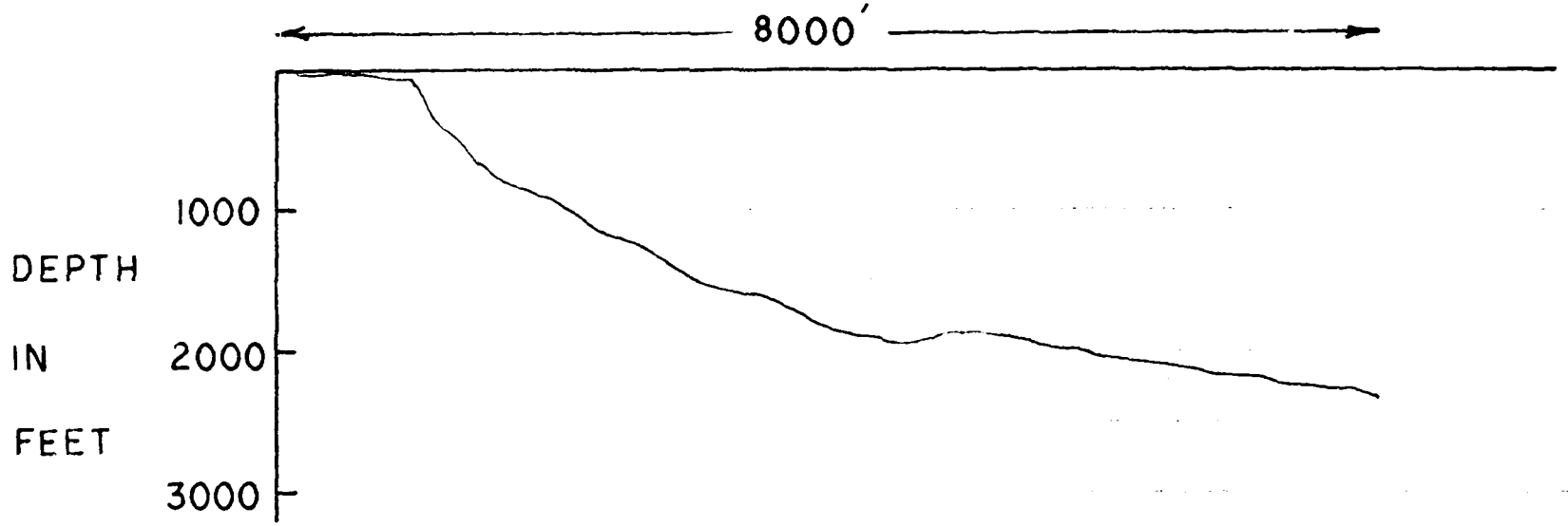
SHEET 2A



SITE 2

TRACK 7

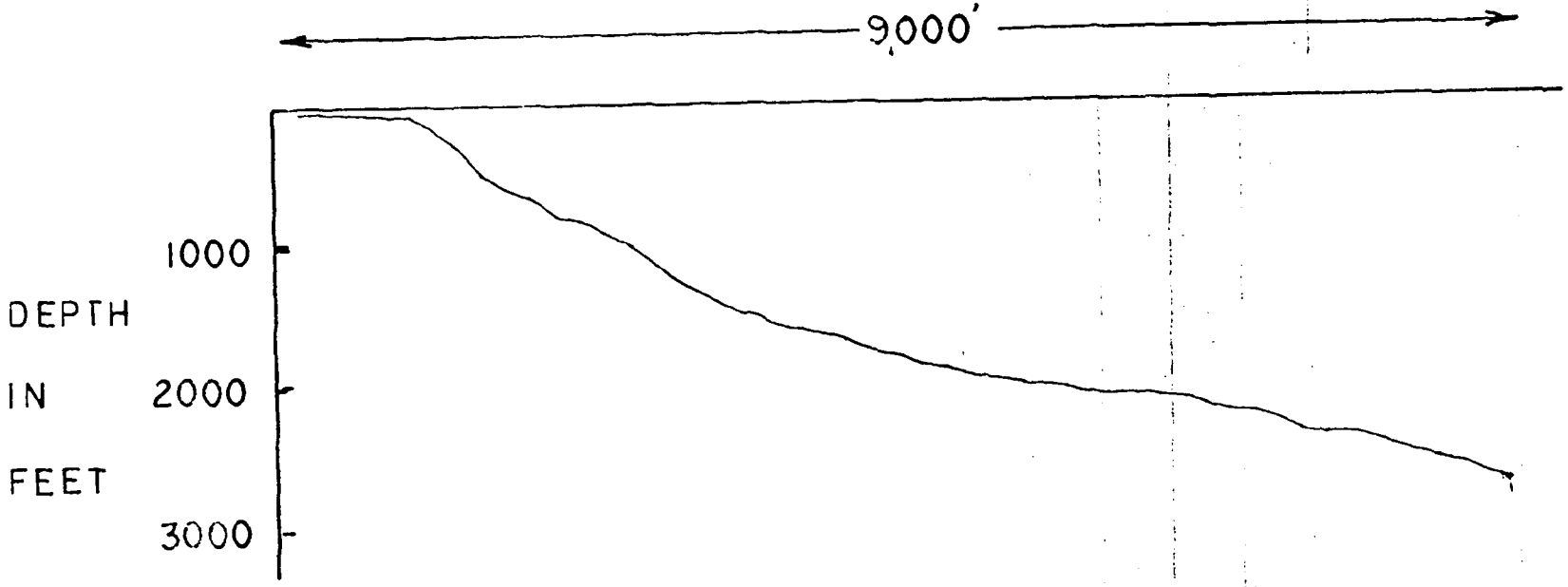
SHEET 2A



SITE 2

TRACK 8

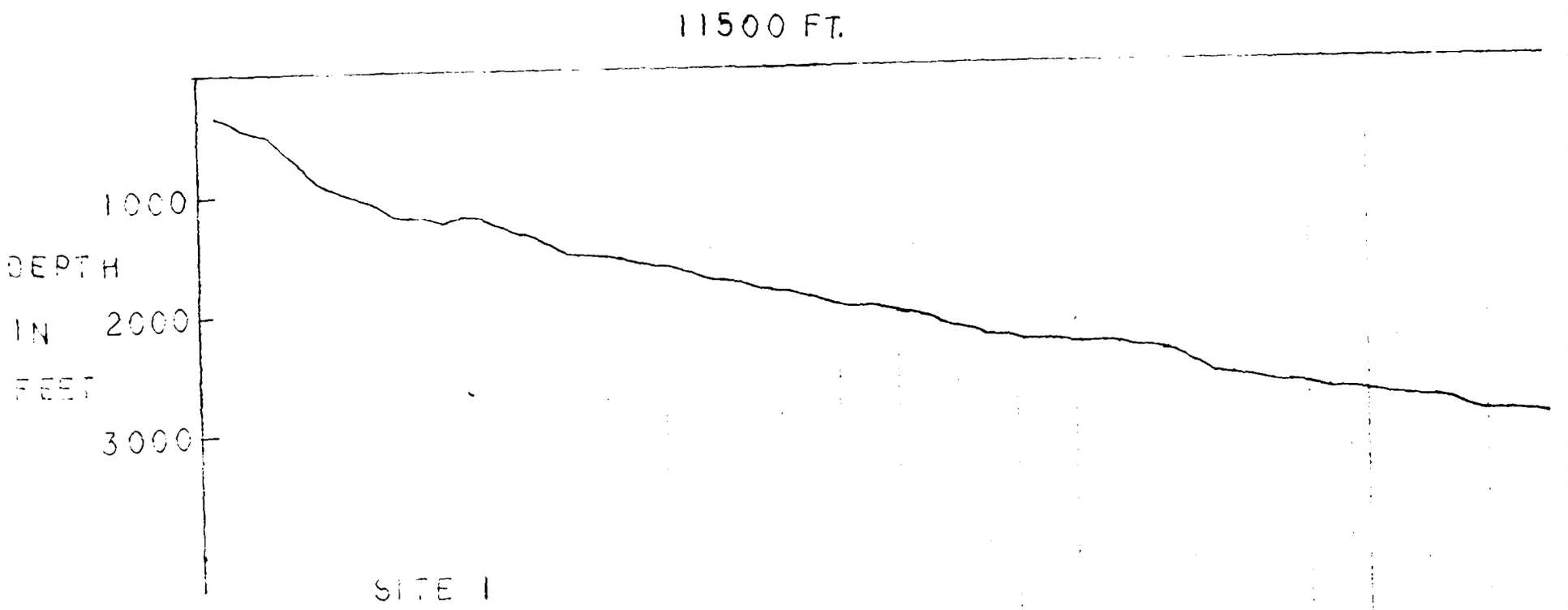
SHEET 2A



SITE 2

TRACK HI CAY

SHEET 2B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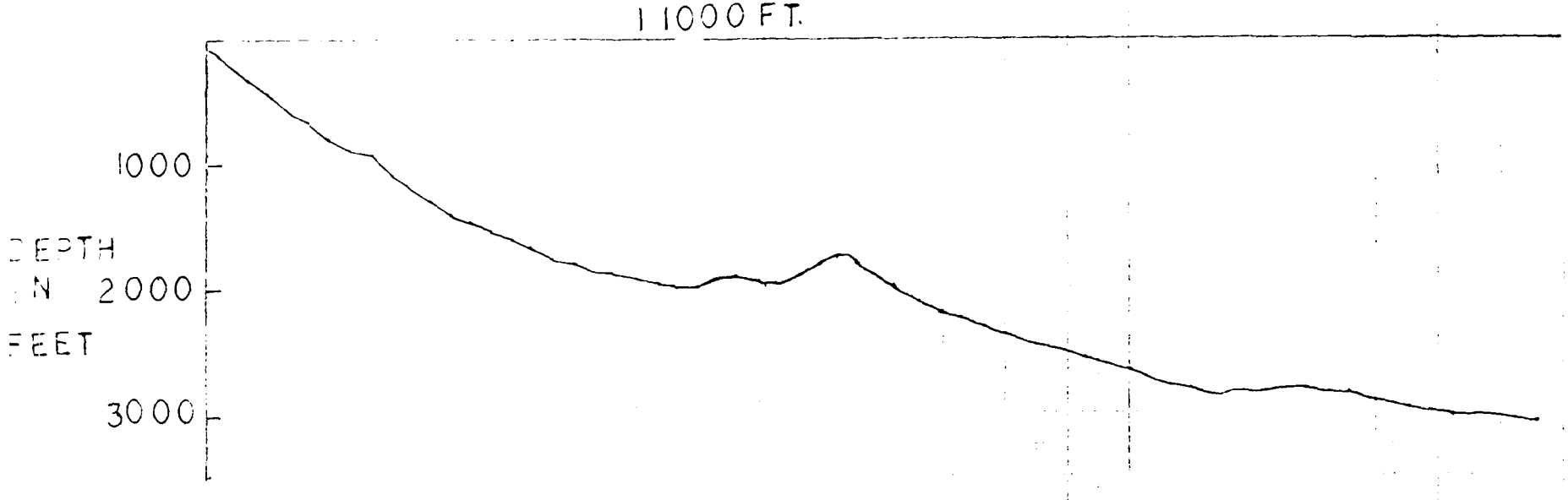
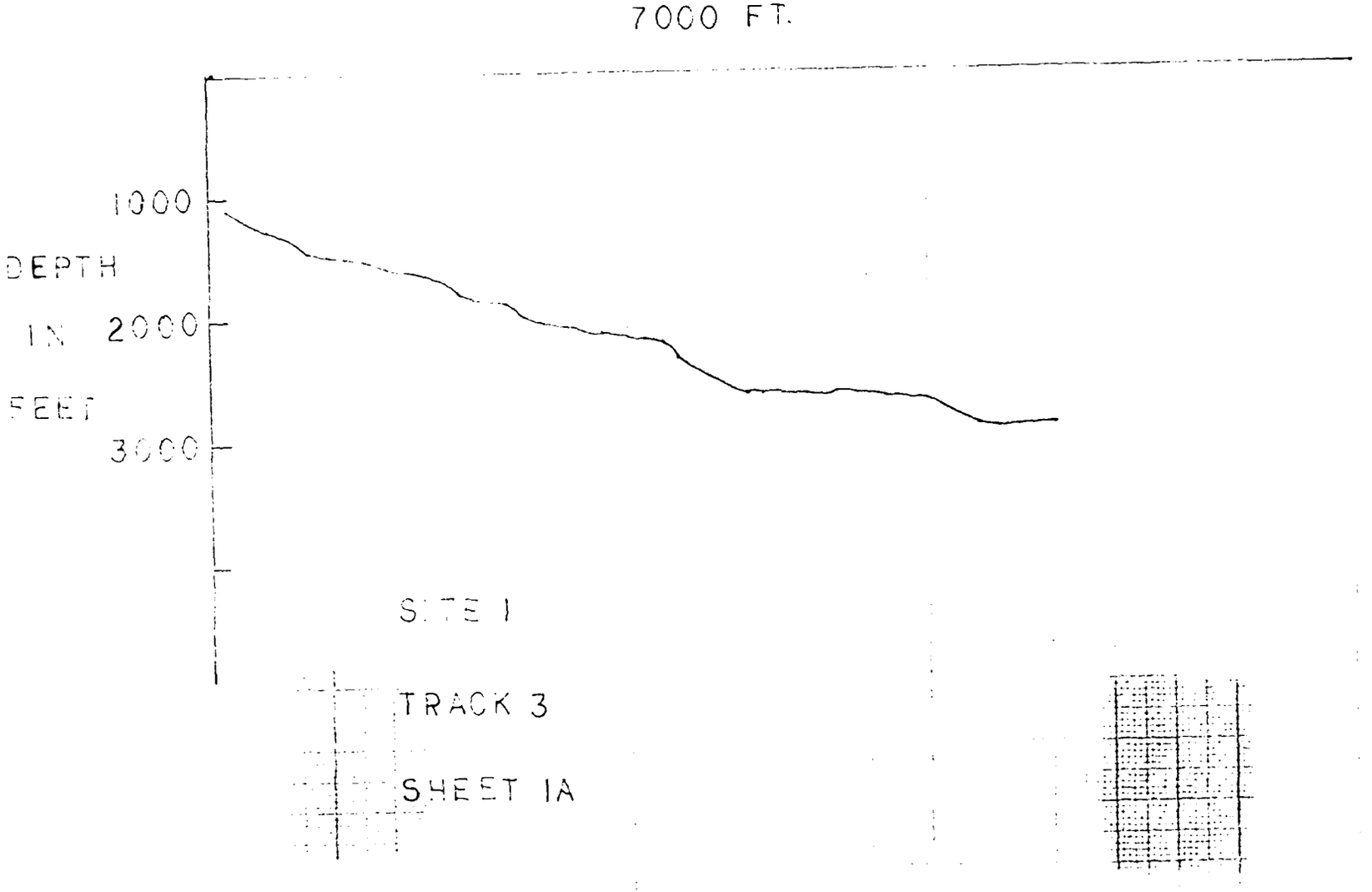
TRACK 1
SHEET 1A



SITE 1

TRACK 2

SHEET 1B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TRACK 3
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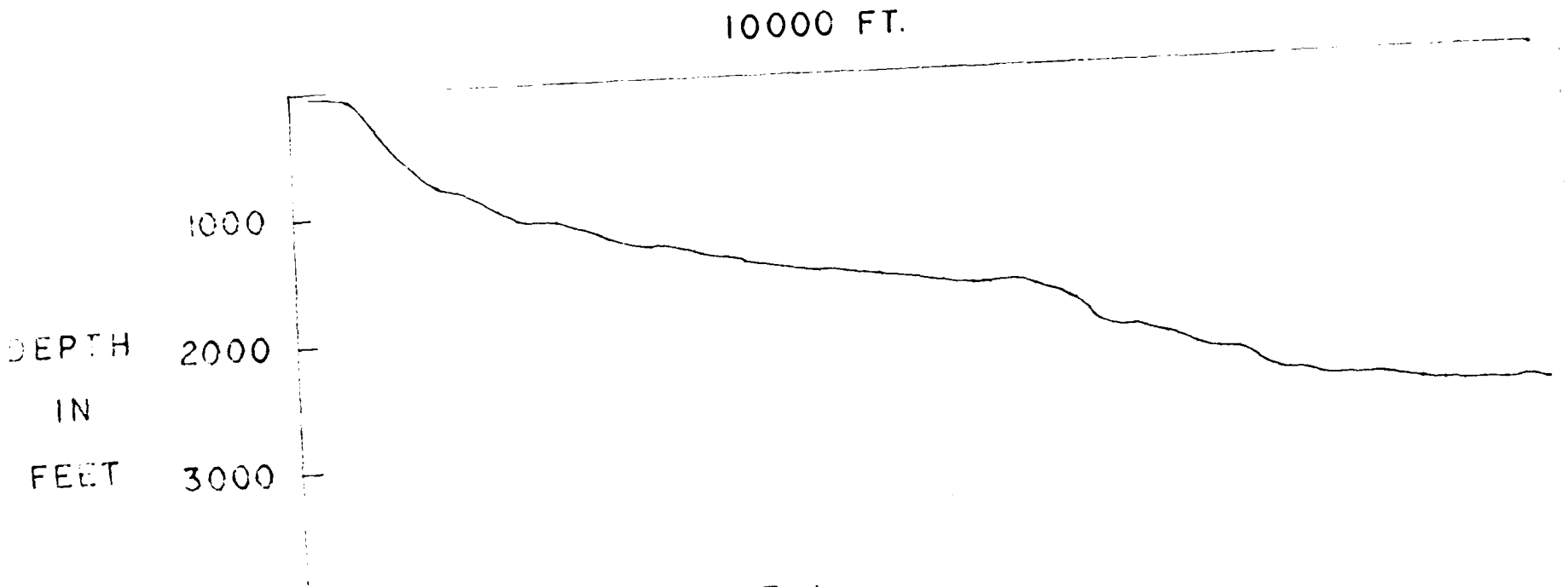
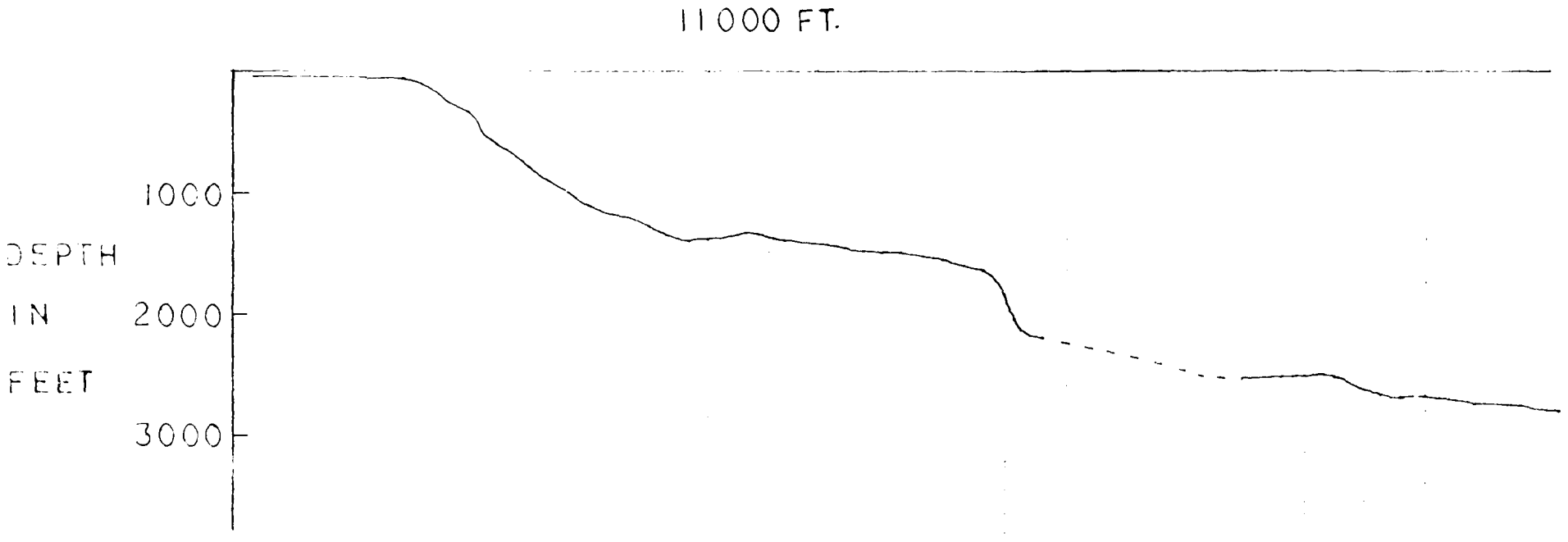


SITE 1

TRACK 4

SHEET 1A



SITE 1

TRACK 5

SHEET 1A

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